

## Tracie Phillips - Re: Sed TEQ

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**From:** Tracie Phillips  
**To:** Larry Koenig; Turner.Philip@epamail.epa.gov  
**Date:** 7/23/2009 12:46 PM  
**Subject:** Re: Sed TEQ  
**CC:** Forsythe.Barry@epamail.epa.gov; John Wilder; Mark Fisher; Marshall Cedilote; Susannah Reilly; Tzhone.Stephen@epamail.epa.gov  
**Attachments:** epa dioxin cleanup value.pdf; epa dioxin cleanup value.pdf

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Hi Everyone,

There have been a lot of e-mails with questions concerning the sediment value the TD calculated. I would like to try to address all of those questions in this e-mail.

First, I want to make sure it is very clear that the value I provided is *not* a recommendation. This value was merely provided, as requested, to EPA as a *potential* screening value for HSC dredge material. The ultimate determination of a recommended sediment-to-fish screening value is deferred to EPA as they are the lead on this federal superfund site. Under the circumstances this was the best value the TD could calculate with the given time constraints. As mentioned previously, this is a *conservative* value. As the lead, EPA may also propose alternative values as the agency sees appropriate.

If the EPA chooses to use the *potential* screening value provided by the TD, the TD believe comparison of the oc-normalized sample TEQ to the screening criterion of 33 ppt ng/kg-oc for 2,3,7,8-TCDD is likely protective for the sediment-to-fish ingestion human exposure pathway. As Larry pointed out, TCDF levels are much higher; however, 2,3,7,8-TCDD is still present. 2,3,7,8-TCDD is the most toxic of the D/Fs and is the congener that all of the TEFs are based on. To give you an example, while 2,3,7,8-TCDD concentrations in the HSC were not as large as other congeners it accounts for an average of 80% of the contribution to the TEQ in catfish measured in the HSC. I hope this illustrates how important the uptake of 2,3,7,8-TCDD is, despite the concentration as compared to other congeners in sediment. Therefore, the use of a 2,3,7,8-TCDD number is appropriate when no TEQ is available.

For comparison to the provided *potential* screening value, sample results would need to be **oc-normalized** on a **dry weight** basis. If this is not done the comparison will not be an apples-to-apples comparison. If oc-normalized data are not provided, then the numbers could be compared to a *non-oc-normalized screening value of 0.45 ppt*. This number was back-calculated using an average TOC from the TMDL data.

Av %TOC in HSC = 1.35%

non-oc-normalized potential screening value = (33 ppt ng/kg-oc) \* (0.0135) = 0.45 ppt

So, in order to have an apples-to-apples comparison and use the provided potential screening value correctly, you can either compare oc-normalized data to 33 ppt ng/kg-oc or compare non-oc-normalized data to 0.45 ppt. This means that the CTCO data Stephen sent out would need to be compared to 0.45 ppt since it is not oc-normalized.

As D/Fs are in fact a problem in HSC fish tissue, it would not be surprising if many HSC sediment results exceed this conservative potential sediment-to-fish screening value.

Also, there was some question about the 1 ppb value and whether or not it is oc-normalized. The 1 ppb value is a policy number set by EPA (see attached pdf) and adopted by TCEQ. This number was originally proposed for soil, but has been adopted for use in sediment. This is *not* an oc-normalized number. There were no BSAFs used

in the development of this number. By definition, BSAF is the ratio (in kilograms of sediment organic carbon per kilogram of lipid) of the lipid-normalized concentration of a chemical in the tissue of an aquatic organism to its *organic carbon-normalized concentration in surface sediment*, in situations where the ratio does not change substantially over time, both the organism and its food are exposed, and the surface sediment is representative of average surface sediment in the vicinity of the organism. Therefore, when you use a BSAF you must compare the resultant value to oc-normalized data. *Since the 1 ppb was not calculated with BSAFs you would compare it to non-oc-normalized data for an apples-to-apples comparison.*

I hope this answers everyone's questions. Please let me know if you have any others.

Tracie

>>> <Turner.Philip@epamail.epa.gov> 7/20/2009 12:59 PM >>>

Thanks Larry. I don't know about the 1 ppb either, but am looking into it. I do know it's a TEQ.

Phil

## Re: Sed TEQ

**Larry Koenig**

to: Philip Turner

07/20/2009 11:28 AM

Cc: Barry Forsythe, Stephen Tzhone, "John Wilder", "Marshall Cedilote", "Mark Fisher", "Susannah Reilly", "Tracie Phillips"

Yes, it means that. The 16 ppt I said is a near-median value was NOT oc-normalized.

Virtually all of our discussions of TMDL data have used dry weight concentrations (not oc-normalized), and I have tried to be specific about that. I do not have a convenient summary of oc-normalized data on which to do quick percentiles and statistics.

The only oc-normed data I have shown was in the 2005 figure made by UH showing sample grid results overlaid on the pit site, and I know I mentioned the difference in units repeatedly. I don't know if anybody heard me. The sediment distribution patterns are virtually the same either way, but the magnitude of the numbers varies substantially.

I am unclear whether the 1 ppb = 1000 ppt cited by others, and used as an upper bound

below, is oc-normalized. There has never been a statement that it is, so I have presumed it is NOT. But I do not know.

lk

>>> <Turner.Philip@epamail.epa.gov> 7/20/2009 11:07 AM >>>

Larry,

Does that mean that the 16 ppt you mentioned as around the median was a non-oc-normalized concentration??

Phil

**Re: Sed TEQ**

**Larry Koenig**

to: Stephen Tzhone, Mark Fisher

07/20/2009 08:38 AM

Cc:

Barry Forsythe, Philip Turner, "John Wilder", "Marshall Cedilote",  
"Susannah Reilly", "Tracie Phillips"

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I get the impression that the **33.7 ng/kg-oc (ppt)** cited below is specific to TCDD. Not clear to me that it accounts for other congeners. Fingerprinting indicates TCDF to be the "signature" of the paper mill sludge at the site.

I note also that no sediment samples collected anywhere by the TMDL project were that low in oc-normalized TEQ. Lowest oc-normalized sediment TEQ found was about 71 ppt. A target lower than any observation could really enlarge the SJR site footprint.

In TMDL land, we are reviewing the ToxDiv comments. However, the TMDL as drafted did not use or rely on any BSAFs, including those reviewed by Toxicology in a quarterly report from five years ago. We will consider revising similarly-derived BAFs that are shown in the document; I do not think that will change the conclusions, but will have to see.

lk

>>> Mark Fisher 7/17/2009 4:31 PM >>>  
Stephen

I'm needing to be clear on the recommendation of 33 ppt to the Corps. As we discussed in Galveston the EPA superfund recommended screening level of 33 ppt was derived from Tracie's email below. Can you please provide some insight on your consideration of the following comments from Tracie's email.

Organic Carbon: "It is important to note the BSAFs were determined based on tissue concentrations relative to organic carbon-normalized sediment concentrations. As such, the target level is based on the organic carbon-normalized sediment concentration (i.e., bulk sample concentration divided by its organic carbon content;"

"However, upon examination, we have significant concerns about the methodology used to calculate the D/F sediment target values and Total D/F value."

Also can clarify if the recommended 33 ppt is wet or dry weight?

Thanks,  
Mark

>>> Tracie Phillips 7/13/2009 5:04 PM >>>  
Hi Stephen,

Typically, TCEQ's role at federal superfund sites in regard to screening values/PRGs is limited to reviewing and providing comments on proposed values. However, as requested by EPA for the San Jacinto Waste Pit site, the Toxicology Division (TD) has explored possible D/F sediment screening values for HSC dredge material considering the sediment-to-fish exposure pathway based on human ingestion. *As this concerns a federal superfund site, TCEQ defers the ultimate determination of a D/F screening value to EPA.* The following is submitted only for your consideration.

The TCEQ residential cleanup value for D/Fs in soil is 1 ppb (TEQ). However, this does not consider the transfer of D/Fs from sediment-to-fish tissue and subsequent human ingestion, which TD believes should be considered if dredge material may come into contact with the aquatic environment (e.g., HSC, San Jacinto River). Evaluation of sediment-to-fish requires BSAFs. To TD's knowledge, the best available information in regard to BSAFs for HSC D/Fs is contained in the TMDL study. *Use of information from the TMDL study has limitations, including that it is for the HSC and not the San Jacinto Waste Pit site specifically, and BSAFs were not lipid normalized (see 4.1.2 of the TMDL study).*

The TMDL study contains calculated BSAFs and sediment target levels for D/Fs in catfish and crabs, including a Total D/F sediment target. Generally, the values for catfish are more conservative than crabs (see Table 4.12a on page 294). Our initial inclination was to rely on the TMDL study to provide potential screening values for your consideration. However, upon examination, we have significant concerns about the methodology used to calculate the D/F sediment target values and Total D/F

value. It will likely take a significant amount of time to reconcile our concerns with the TMDL study authors. However, as a conservative screening value for your consideration we have calculated a sediment screening value (based on 2,3,7,8-TCDD) which considers the sediment-to-fish tissue exposure pathway based on fish ingestion. This conservative sediment screening value for sediment D/Fs is **3.37E-05 mg/kg-oc (ppm) or 33.7 ng/kg-oc (ppt)** using the CSF for 2,3,7,8-TCDD of 1.56E05 per mg/kg-d, TEF of 1, 1E-05 risk level, 70 kg body weight, 0.015 kg/d fish tissue consumption rate, and median BSAF of 8.88E-03 (for 2,3,7,8-TCDD in catfish) from the TMDL study. It is important to note the BSAFs were determined based on tissue concentrations relative to organic carbon-normalized sediment concentrations. As such, the target level is based on the organic carbon-normalized sediment concentration (i.e., bulk sample concentration divided by its organic carbon content; see Section 4.1.8 of the TMDL study). *Therefore, any sediment data compared to this number would also need to be organic carbon-normalized.*

#### Calculation

potential D/F sediment screening value for your consideration (mg/kg) =  $[(RL \times BW) / (CSF \times TEF \times CR)] / BSAF$

where: RL = risk level (1E-05)

BW = body weight (70 kg)

CSF = cancer slope factor of 1.56E05 per mg/kg-d

CR = consumption rate (0.015 kg/d)

BSAF = 8.88E-03 (HSC TMDL study median)

TEF = 1 for 2,3,7,8-TCDD

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**Tracie Phillips, Ph.D.** | Senior Toxicologist | TCEQ

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